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## CALVERT CLIFFS NUCLEAR POWER PLANT

October 20, 2011

U.S. Nuclear Regulatory Commission  
Washington, DC 20555

**ATTENTION:** Document Control Desk

**SUBJECT:** Calvert Cliffs Nuclear Power Plant  
Unit No. 1; Docket No. 50-317; License No. DPR 53  
Licensee Event Report 2011-001, Revision 00  
Reactor Trip Due to a Phase-to-Phase Short Circuit on Main Transformer

The attached report is being sent to you as required by 10 CFR 50.73. Should you have questions regarding this report, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

A handwritten signature in black ink that reads "Christopher R. Costanzo".

Christopher R. Costanzo  
Plant General Manager

CRC/CAN/bjd

Attachment: As stated

cc: D. V. Pickett, NRC  
W. M. Dean, NRC

Resident Inspector, NRC  
S. Gray, DNR

IE 22

NRR

<b>NRC FORM 366</b> (10-2010)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		APPROVED BY OMB: NO. 3150-0104		EXPIRES: 10/31/2013																																					
<b>LICENSEE EVENT REPORT (LER)</b>  (See reverse for required number of digits/characters for each block)																																											
<b>1. FACILITY NAME</b> Calvert Cliffs Nuclear Power Plant, Unit 1				<b>2. DOCKET NUMBER</b> 05000 317		<b>3. PAGE</b> 1 OF 6																																					
<b>4. TITLE</b> Reactor Trip Due to a Phase-to-Phase Short Circuit on Main Transformer																																											
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>																																					
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<b>9. OPERATING MODE</b>  <div style="text-align: center; font-size: 24px;">1</div>			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> <i>(Check all that apply)</i>																																								
<b>10. POWER LEVEL</b>  <div style="text-align: center; font-size: 24px;">100</div>			<table style="width:100%;"> <tr> <td><input type="checkbox"/> 20.2201(b)</td> <td><input type="checkbox"/> 20.2203(a)(3)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td><input type="checkbox"/> 20.2201(d)</td> <td><input type="checkbox"/> 20.2203(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(1)</td> <td><input type="checkbox"/> 20.2203(a)(4)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)(B)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(ii)</td> <td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(x)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td> <td><input type="checkbox"/> 73.71(a)(4)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iv)</td> <td><input type="checkbox"/> 50.46(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td> <td><input type="checkbox"/> 73.71(a)(5)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td> <td><input type="checkbox"/> OTHER</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(vi)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(D)</td> <td>Specify in Abstract below or in NRC Form 366A</td> </tr> </table>					<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A
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<b>12. LICENSEE CONTACT FOR THIS LER</b>																																											
FACILITY NAME C. A. Neyman, Senior Engineering Analyst						TELEPHONE NUMBER (Include Area Code) 410-495-3507																																					
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>																																											
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT																																				
B	EL	XFMR	M380	Y	X	EK	DG																																				
<b>14. SUPPLEMENTAL REPORT EXPECTED</b>																																											
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/> NO																																							
<b>15. EXPECTED SUBMISSION DATE</b>				MONTH	DAY	YEAR																																					
<b>ABSTRACT</b> <i>(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)</i>  On August 27, 2011, at 2248 eastern daylight time, Unit 1 experienced an automatic reactor trip from 100 percent power. The Reactor Protective System actuated on loss of load. The loss of load occurred due to a phase-to-phase short circuit on the main transformer when main transformer lines were struck by dislodged Turbine Building siding caused by winds associated with Hurricane Irene. Immediately following the short circuit, 14 Containment Air Cooler stopped operating. Shortly after the plant trip occurred, 1A Emergency Diesel Generator was declared inoperable due to a shorted speed switch. The root cause analysis performed to address this event concluded that the Turbine Building Northwest corner siding was not installed per design during original construction. This resulted in a weaker siding connection to the Turbine Building structure, allowing the siding to come off in wind speeds less than design. At Calvert Cliffs, there have been no recent similar events involving a reactor trip associated with severe weather. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) due to Reactor Protective System actuation. Corrective actions include testing and inspection of the main transformer, replacement of B and C phase high line drops to the main transformer and inspection and repair of electrical connectors on the 1A Emergency Diesel Generator.																																											

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**I. DESCRIPTION OF EVENT**

**A. PRE-EVENT PLANT CONDITIONS**

Unit 1 was operating at 100 percent of rated thermal power on August 27, 2011.

**B. EVENT**

On August 27, 2011 at 2248 eastern daylight time, Calvert Cliffs Nuclear Power Plant Unit 1 automatically shut down from 100 percent power on loss of load signal from the Reactor Protective System. The loss of load signal was generated when siding from the Turbine Building became dislodged during high winds from Hurricane Irene and contacted the B and C phase high line drops going to 1XU-25000-12 transformer causing a phase differential. All control rods fully inserted, there was no loss of normal heat removal. Unit 2 remained at full power during the event on Unit 1.

The short circuit resulted in an explosion, which met emergency action level declaration criteria A.U.6.2.2, "Unanticipated explosion within Protected Area resulting in visible damage to permanent structures or equipment." An Unusual Event was declared at 2302. Follow-up investigation determined no fire resulted from the explosion, which was attributed to arc flash.

Following the trip, Emergency Operating Procedure (EOP)-0, "Post Trip Immediate Actions," was implemented. All safety functions were met during EOP-0 indicating an uncomplicated reactor trip response, allowing transition to EOP-1, "Reactor Trip," at 2300. During implementation of EOP-1, it was noted that 14 Containment Air Cooler (one of four Containment Air Coolers) had stopped running. An investigation determined the containment air cooler had stopped running due to an instantaneous voltage drop that had occurred on the site distribution system during the phase-to-phase short event. This short duration voltage drop caused the containment air cooler's controller to drop out and secure it. The containment air cooler was restarted without issue.

Once the unit was stable in Mode 3, numerous alarms were received for the 1A Emergency Diesel Generator (EDG) (one of two safety-related EDGs dedicated to Unit 1). Water was intruding down the diesel generator exhaust piping resulting in a DC ground. Based on these indications the 1A EDG was declared inoperable and appropriate Technical Specifications implemented. During the event, there was no demand for the 1A EDG.

Otherwise, plant response was as expected and EOP-1 was exited on August 28, 2011, at 0130. At that time, Operators entered Operating Procedure (OP)-4, for plant shutdown from power operation to hot standby.

On August 28, 2011, at 0755, the licensee exited the Unusual Event condition based on the fact that the affected equipment was inspected in the daylight to determine the extent of the damage.

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This licensee event report (LER) is applicable to Calvert Cliffs Nuclear Power Plant Unit 1 only.

**C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT**

There were no inoperable structures, components, or systems that contributed to the event.

**D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:**

The reactor trip occurred on August 27, 2011, at 2248. Operators implemented EOP-0 and performed post-trip immediate actions. The 14 Containment Air Cooler stopped at the time of the reactor trip.

At 2254, a Nuclear Regulatory Commission inspector reported hearing an explosion near the Unit 1 main transformers at the time when the reactor trip occurred.

At 2258, operators exited EOP-0. At 2300, operators entered EOP-1 and performed actions associated with an uncomplicated reactor trip.

At 2302, an Unusual Event was declared for report of an explosion within the Protected Area that affected plant equipment.

On August 28, 2011, at 0000, the 1A EDG was declared inoperable due to receiving several alarms. The 1B EDG was verified operable and the 0C Diesel Generator was verified available.

At 0130, operators exited EOP-1 and entered OP-4, for plant shutdown from power operation to hot standby.

At 0145, the 14 Containment Air Cooler was restarted.

At 0755, the licensee exited the Unusual Event.

On August 29, 2011 at 1030, the 1A EDG was declared operable. Total elapsed time of inoperability was 34.5 hours.

Inspections were performed on the affected equipment and the reactor was taken critical on August 31, 2011, at 0113.

At 1008, the unit was paralleled to the grid.

At 2319, the unit was returned to 100 percent power.

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**E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED**

No other systems or secondary functions were affected.

**F. METHOD OF DISCOVERY**

The event was self-revealing.

**G. MAJOR OPERATOR ACTION**

No major operator actions were taken as a result of this condition.

**H. SAFETY SYSTEM RESPONSES**

The Reactor Protective System operated as required. The 14 Containment Air Cooler stopped at the time of the reactor trip. The 1A EDG was declared inoperable due to receiving several alarms. There were no safety system functional failures.

**II. CAUSE OF EVENT:**

The Unit 1 reactor trip is documented in station condition report number CR-2011-008704. The reactor trip occurred due to a phase-to-phase short when main transformer lines were struck by dislodged Turbine Building siding caused by winds associated with Hurricane Irene. Turbine Building Northwest corner siding was not installed per design during original construction resulting in a weaker siding connection to the Turbine Building structure, allowing the siding to come off in wind speeds less than design.

The Turbine Building siding on the Northwest corner was not fastened to the top two support members, the west most panel on the north face was fastened from the inside, and the bottom 18 feet of the west most panel had no fasteners. These connections cannot be seen with the siding installed.

The stoppage of 14 Containment Air Cooler is documented in station condition report CR-2011-008715. An investigation determined the containment air cooler had stopped running due to an instantaneous voltage drop that had occurred on the site distribution system during the phase-to-phase short event. This short duration voltage drop caused the containment air cooler's controller to drop out and secure it. The containment air cooler was restarted without issue.

The inoperable 1A EDG is documented in station condition report number CR-2011-008708. The penetration around the 1A2 combustion air intake pipe on 80 foot level of the 1A Diesel Generator Building was unable to perform its design function of being leak tight. Dripping water penetrated the 1A EDG 1A2 speed switch connector causing the speed switch circuit to short. This shorted speed switch caused the 1A EDG field flash circuit to attempt to flash the 1A EDG. Since the generator was not turning, a field was not established and the field flash circuit

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protective features were enabled. Because these protective features were enabled, the field flash circuit would not have been available for subsequent EDG starts. Evaluation has determined that the most likely root cause(s) are limited to improper installation, manufacturing defect, or original design considerations.

III. ANALYSIS OF THE EVENT:

This event resulted in a valid actuation of the Reactor Protective System. The actuation was not part of a pre-planned sequence during testing or reactor operation. Therefore, this event is reportable in accordance with 10 CFR 50.73(a)(2)(IV)(A). Immediate notification of this event (Event Number 47208) was made on August 27, 2011, at 2327 in accordance with 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(a)(1)(i).

The Nuclear Regulatory Commission Performance Indicator for Unplanned Scrams per 7,000 Critical Hours is projected to rise to approximately 0.8 and remain green. No other performance indicators were impacted.

There were no actual nuclear safety consequences incurred from this event. An estimated conditional core damage probability of 2.02E-06 and an estimated conditional large early release probability of 1.72E-07 were calculated for this event.

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. The main transformer was inspected and tested to detect any abnormalities. No abnormal conditions were found.
2. The B and C phase high line drops going to the main transformer were replaced.
3. Affected electrical connectors on the 1A EDG were disassembled, inspected, and repaired.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE

1. Perform temporary repair to Northwest Turbine Building corner siding.
2. Replace Turbine Building corner siding per design requirements.
3. Repair the combustion air inlet piping penetrations for the 1A EDG to ensure the penetrations are leak tight.

If information is subsequently developed, that would significantly affect a reader's understanding or perception of this event, a supplemental LER will be submitted.

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V. ADDITIONAL INFORMATION

A. FAILED COMPONENTS:

1. The 25 kV to 500 kV step up transformer was manufactured by Mitsubishi Heavy Industries.
2. The 1A EDG was manufactured by Societe Alsacienne De Constructions Mecaniques De Mulhouse.

B. PREVIOUS LERs ON SIMILAR EVENTS

A review of Calvert Cliffs' events over the past several years was performed. No previous LERs on similar events (reactor trip associated with severe weather) were identified.

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT  
FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM  
REFERRED TO IN THIS LER:

Component	IEEE 803 EIIS Function	IEEE 805 System ID
Transformer	XFMR	EL
1A Diesel Generator	DG	EK
14 Containment Air Cooler	CLR	BK

D. SPECIAL COMMENTS

None